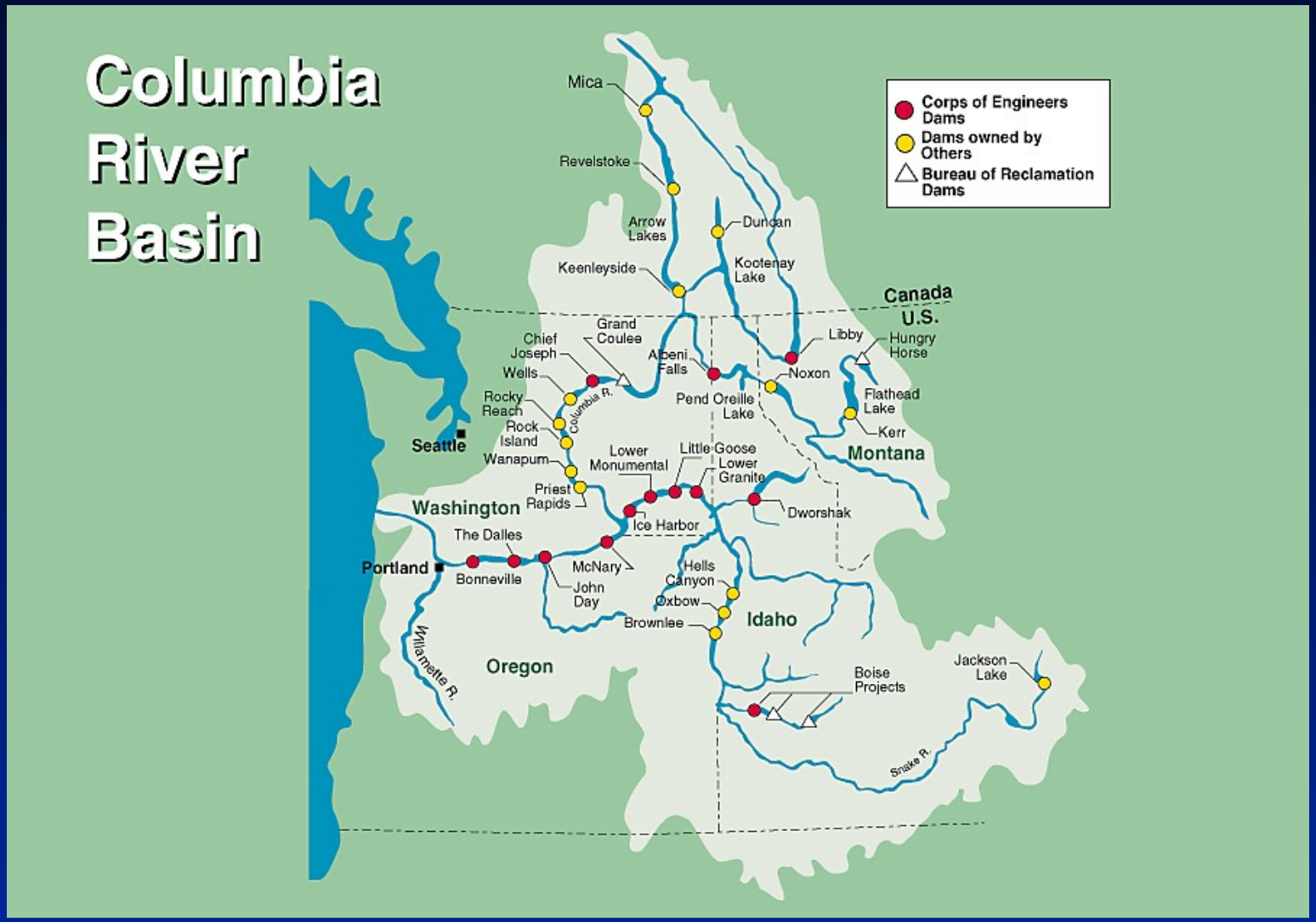
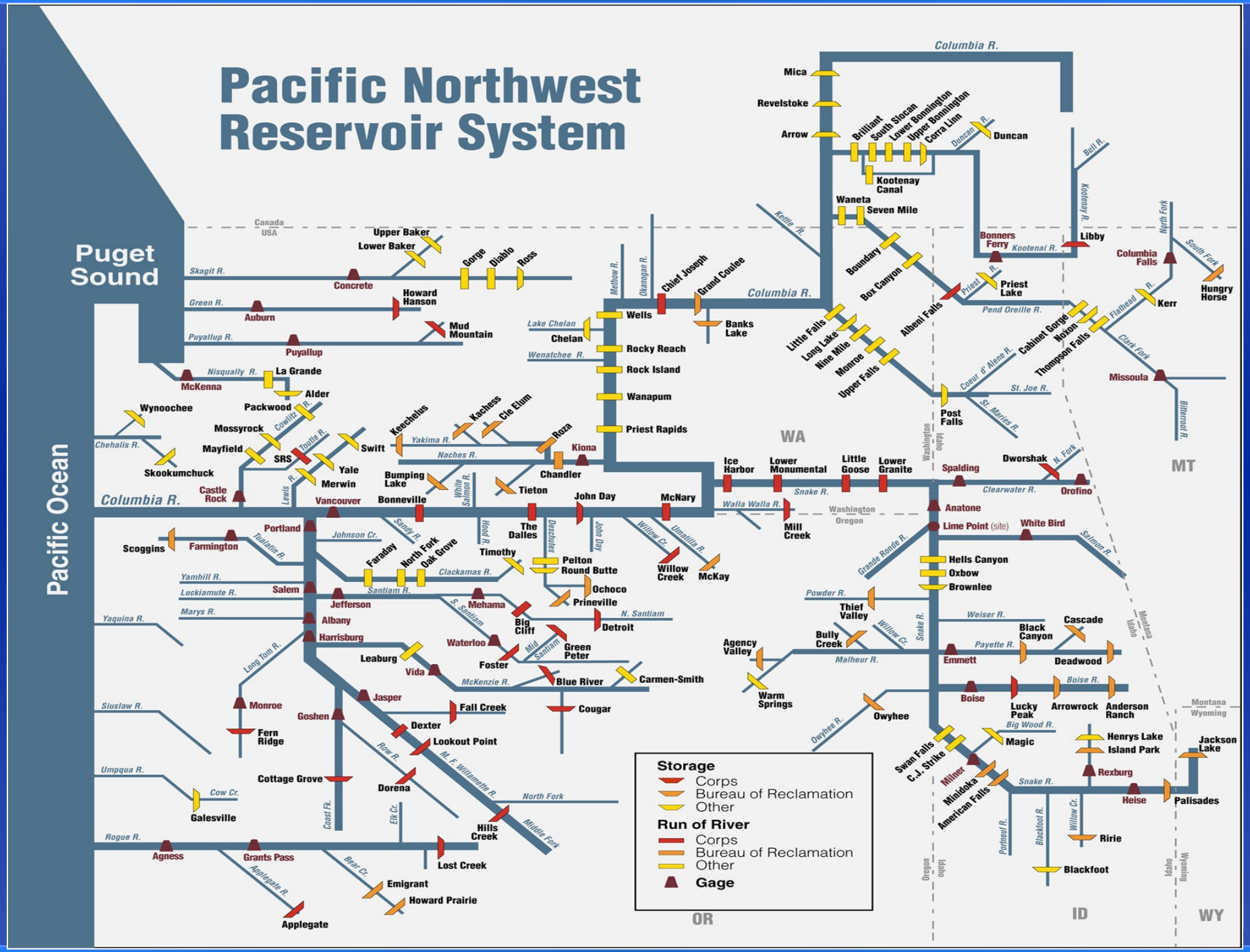
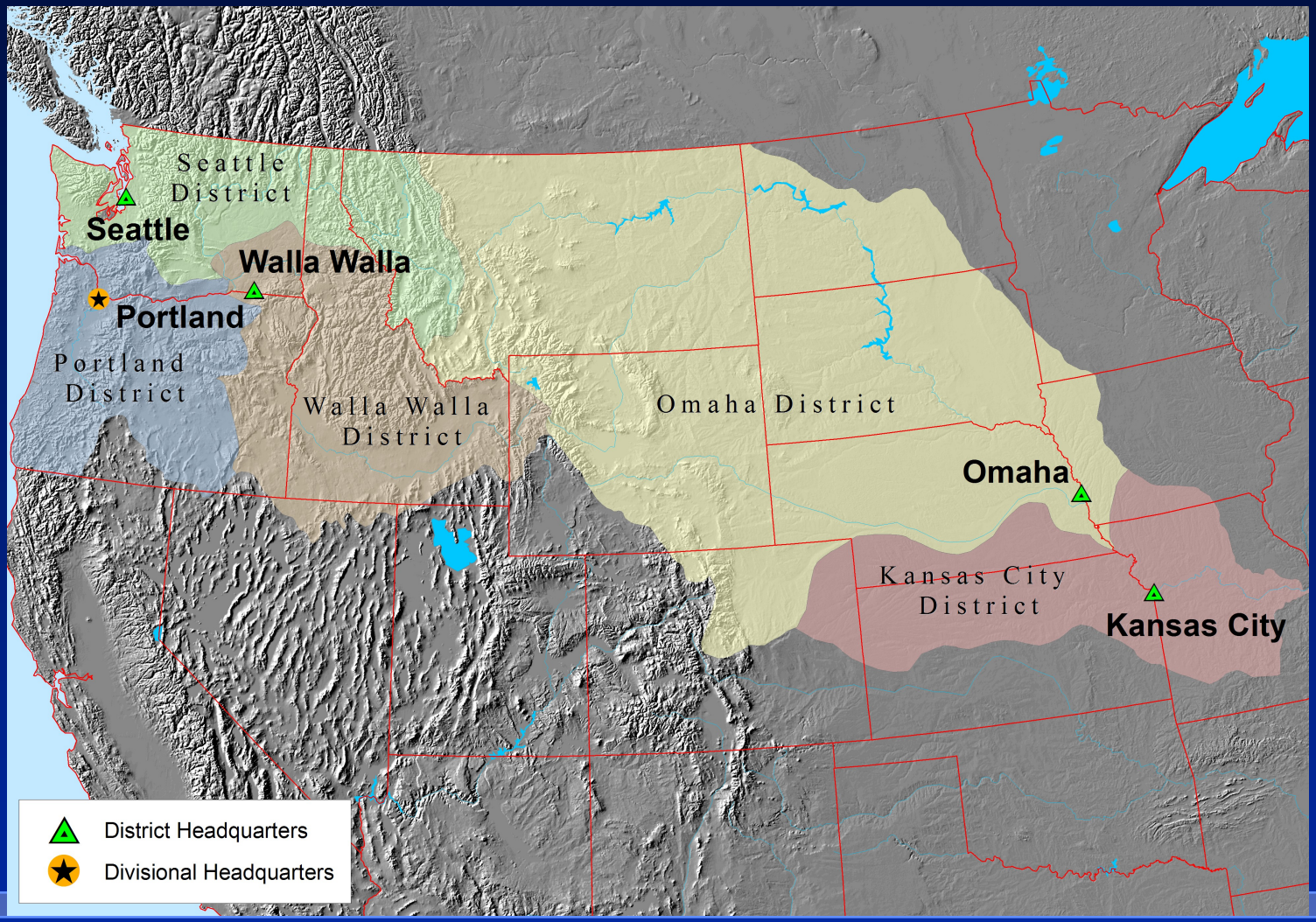
COLUMBIA BASIN WATER MANAGEMENT

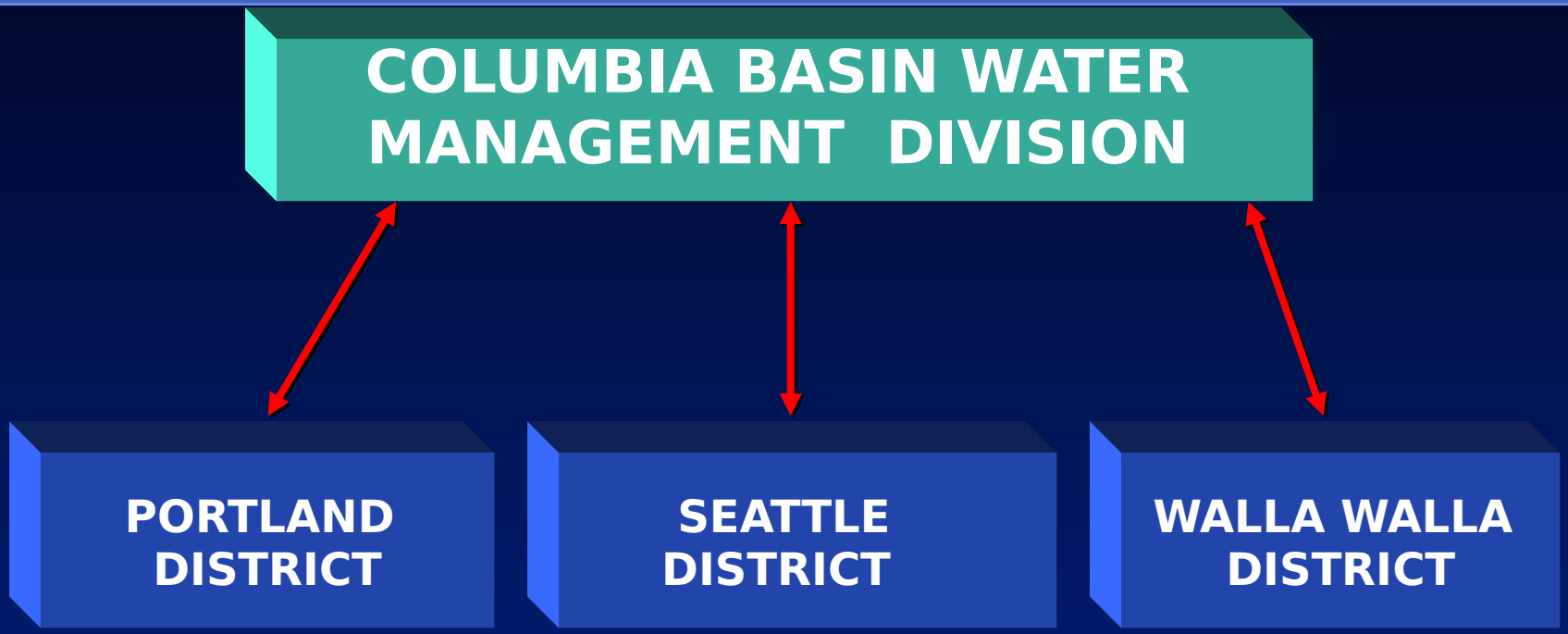
Columbia River Basin




Pacific Northwest Reservoir System
Puget Sound
Pacific Ocean
Canada
USA
Columbia R.
Mica
Revelstoke
Arrow
Brilliant
South Slocan
Lower Bonnington
Upper Bonnington
Corra Linn
Duncan R.
Duncan
Kootenay Canal
Waneta
Seven Mile
Kettle R.
Boundary
Box Canyon
Priest R.
Priest Lake
Albeni Falls
Pend Oreille R.
Bonners Ferry
Kootenai R.
Libby
Kootenay R.
Bull R.
Columbia Falls
North Fork
South Fork
Hungry Horse
Kerr
Flathead R.
Cabinet Gorge
Noxon
Thompson Falls
Clark Fork
Missoula
Bitterroot R.
Little Falls
Long Lake
Nine Mile
Monroe
Upper Falls
Coeur d' Alene R.
St. Joe R.
St. Maries R.
Post Falls
Upper Baker
Lower Baker
Gorge
Diablo
Ross
Skagit R.
Concrete
Howard Hanson
Green R.
Auburn
Mud Mountain
Puyallup R.
Puyallup
Nisqually R.
La Grande
McKenna
Alder
Packwood
Wynoochee
Mossyrock
Cowlitz R.
Chehalis R.
Mayfield
Toutle R.
SRS
Swift
Yale
Merwin
Skookumchuck
Lewis R.
Castle Rock
Columbia R.
Vancouver
Portland
Scoggins
Farmington
Tualatin R.
Johnson Cr.
Sandy R.
Bonneville
Keechelus
Kachess
Cle Elum
Yakima R.
Naches R.
Roza
Kiona
Chandler
Bumping Lake
White Salmon R.
Tieton
Hood R.
The Dalles
Deschutes
John Day
McNary
Willow Cr.
Umatilla R.
Willow Creek
McKay
Timothy
Pelton
Round Butte
Ochoco
Prineville
Faraday
North Fork
Oak Grove
Clackamas R.
Yamhill R.
Luckiamute R.
Salem
Santiam R.
Jefferson
Mehama
S. Santiam
N. Santiam
Detroit
Big Cliff
Albany
Marys R.
Yaquina R.
Harrisburg
Waterloo
Mid Santiam
Green Peter
Foster
Leaburg
Vida
McKenzie R.
Blue River
Carmen-Smith
Cougar
Long Tom R.
Jasper
Fall Creek
Dexter
Lookout Point
Goshen
Monroe
Fern Ridge
Siuslaw R.
Row R.
M. F. Willamette R.
North Fork
Middle Fork
Hills Creek
Cottage Grove
Dorena
Umpqua R.
Cow Cr.
Galesville
Coast Fk.
Elk Cr.
Rogue R.
Agness
Grants Pass
Applegate R.
Bear Cr.
Emigrant
Howard Prairie
Lost Creek
Applegate
Chief Joseph
Grand Coulee
Methow R.
Okanogan R.
Lake Chelan
Chelan
Wenatchee R.
Wells
Rocky Reach
Rock Island
Wanapum
Priest Rapids
Banks Lake
WA
Ice Harbor
Lower Monumental
Little Goose
Lower Granite
Snake R.
Walla Walla R.
Mill Creek
Washington
Oregon
Idaho
Spalding
Dworshak
N. Fork
Clearwater R.
Orofino
MT
Anatone
Lime Point (site)
White Bird
Salmon R.
Grande Ronde R.
Hells Canyon
Oxbow
Brownlee
Powder R.
Thief Valley
Bully Creek
Agency Valley
Warm Springs
Willow Cr.
Snake R.
Weiser R.
Black Canyon
Cascade
Payette R.
Emmett
Deadwood
Malheur R.
Owyhee R.
Owyhee
Boise R.
Boise
Lucky Peak
Arrowrock
Anderson Ranch
Montana
Idaho
Montana
Wyoming
Big Wood R.
Magic
Swan Falls
C.J. Strike
Milner
Minidoka
American Falls
Henrys Lake
Island Park
Rexburg
Heise
Jackson Lake
Palisades
Snake R.
Portneuf R.
Blackfoot R.
Willow Cr.
Ririe
Blackfoot
Oregon
Idaho
Wyoming
Idaho
ID
WY
OR
Storage
Corps
Bureau of Reclamation
Other
Run of River
Corps
Bureau of Reclamation
Other
Gage

Corps Northwestern Division Organization





- Division focus is on system and mainstem aspects
- District focus is on tributaries and technical support
- Functions as an interdependent regional team
- Well integrated with other functions like Emergency Management for crisis response

COLUMBIA BASIN WATER MANAGEMENT DIVISION

HYDROLOGIC ENGINEERING AND POWER BRANCH

Hydrologic Engineering
- Flood Risk Management
- Modeling and Forecasting
- Water Control Data System

Hydropower
- Operating Plans
- Columbia Treaty
- PNCA
- System Analysis and Studies

RESERVOIR CONTROL CENTER

Implement Annual Operating Plans
- Flood Control
- Fishery
- Hydroelectric
- Columbia Treaty

Real Time Operations

RESERVOIR CONTROL CENTER

RESERVOIR REGULATION UNIT

WATER QUALITY TEAM

HYDROPOWER COORDINATION

FISH TEAM

RESERVOIR CONTROL RESPONSIBILITIES

Reservoir Regulation Unit:

- Real-time operation and coordination of Columbia and Snake Rivers.
- Operation for Flood control, Fish and Wildlife, Power, Irrigation, Navigation, Recreation, Treaty, etc.

Water Quality Team:

- Command and control of Total Dissolved Gas Program
- BiOp consultation, Technical Management Team (TMT), Programmatic/regulatory review and coordination, modeling

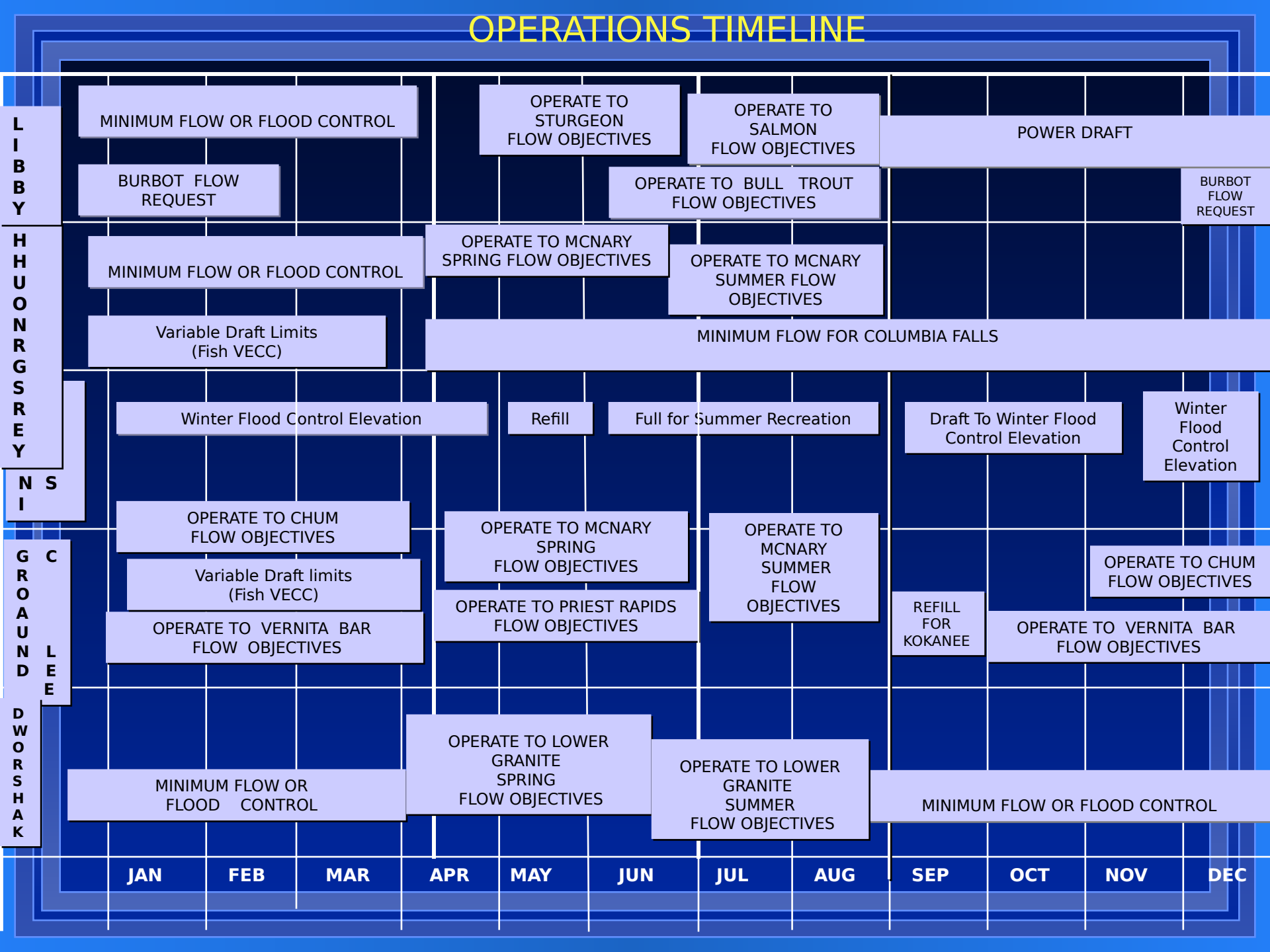
Fishery Team:

- Real-time fishery operations, TMT support, ESA consultation
- Fish Passage Plan and anadromous fish evaluation program

Hydropower Coordination:

- Real-time outage scheduling, maintenance scheduling for planning, integration of transmission and other outages

OPERATIONS TIMELINE



HYDROLOGIC ENGINEERING AND POWER BRANCH RESPONSIBILITIES

Hydropower Planning and Operations Team:

- Columbia River Treaty
- Pacific Northwest Coordination Agreement (PNCA)
- System analysis and studies

Hydrologic Engineering Team:

- Flood risk management planning and operations
- Hydrologic modeling and forecasting
- Water Control Data System
- Quality assurance

Water Control Data

- Water management data collected and stored for approximately 1,000 different locations in Columbia Basin
- Data includes reservoir data, streamflow, precipitation, snowpack, water quality, etc.
- Approximately 25,000 data values per hour of incoming data go into database shared by all offices
- Extensive websites and reports to share information with stakeholders

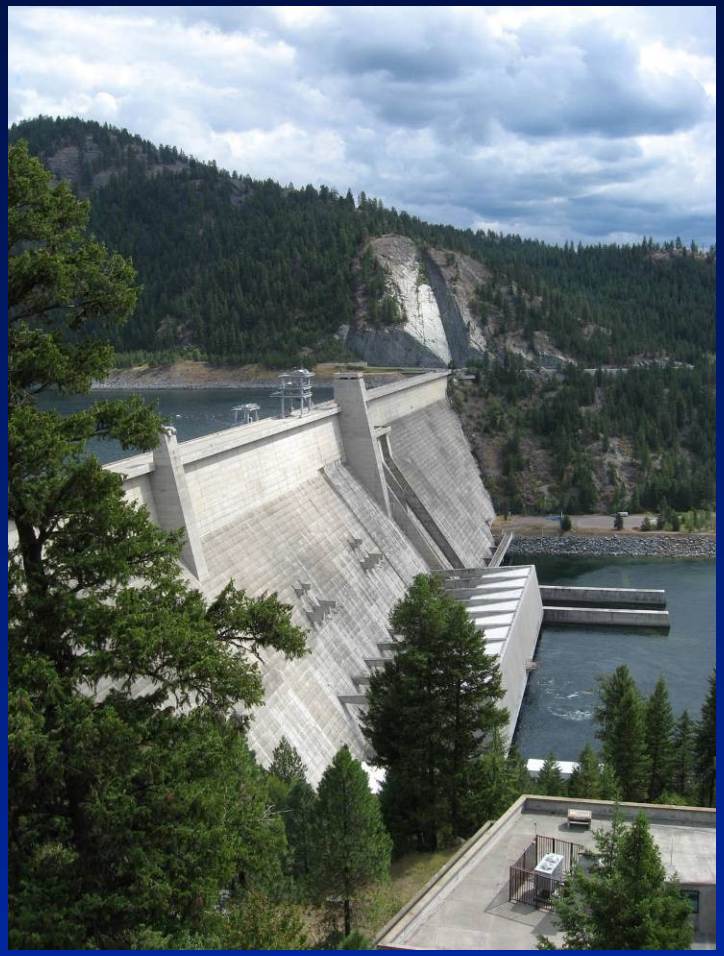
CHALLENGES

- Managing increasingly constrained system to meet multiple competing uses
- Extensive (growing) coordination and reporting requirements
- Operating within constrained budget environment with smaller staff

GRAND COULEE DAM

- **Initial Project and Powerhouse completed in 1942**
- **Total gross storage = 9107.4 KAF**
- **Nameplate capacity = 6,494 MW**

LIBBY



- **Initial Project and Powerhouse completed in 1976, unit 5 was installed in 1984**
- **Total gross storage = 5869.4 KAF**

DWORSHAK

- **Initial Project and Powerhouse completed in 1973**
- **Total gross storage = 3468 KAF**
- **Nameplate capacity = 400 MW**

HUNGRY HORSE

- **Initial Project and Powerhouse completed in 1953**
- **Total gross storage = 3467.2 KAF**
- **Nameplate capacity = 285 MW**

JOHN DAY DAM

- **Initial Project and Powerhouse completed in 1971**
- **Total gross storage = 2523.9 KAF**
- **Nameplate capacity = 2160 MW**

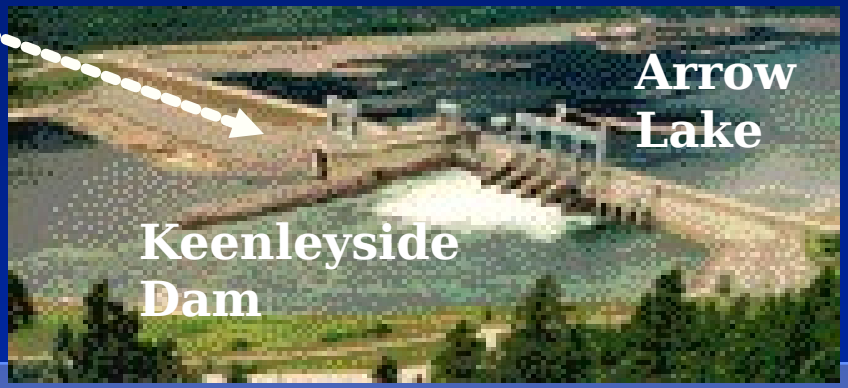
THE DALLES DAM

- **Initial Project and Powerhouse completed in 1960, additional units completed in 1973**
- **Total gross storage = 330 KAF**
- **Nameplate capacity = 1696 MW**

Bonneville Dam

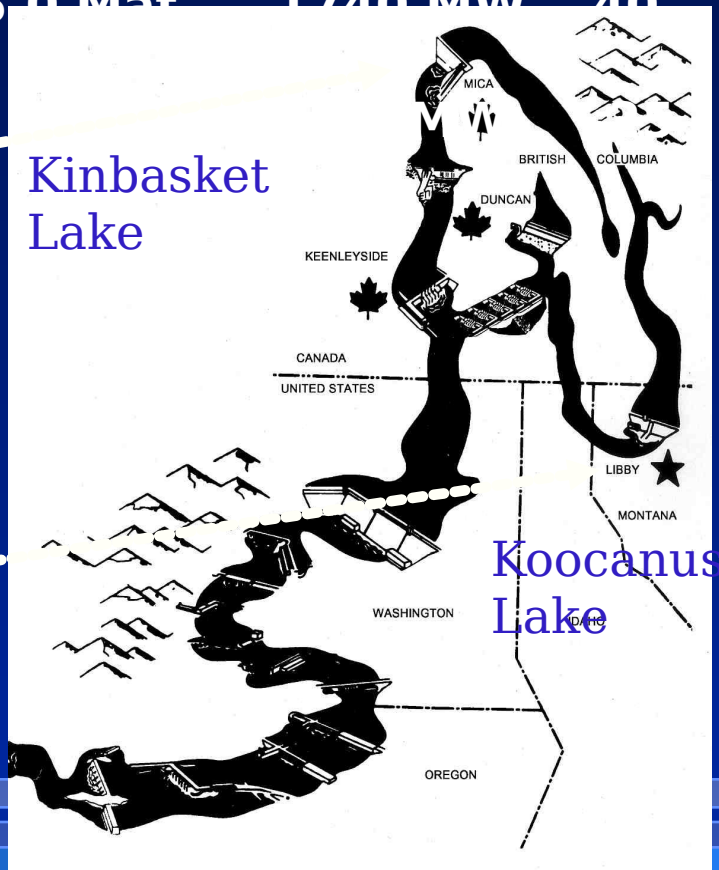
Duncan and Arrow

Dam	Completed	Treaty Storage	Non-Treaty Storage	Generator Capacity	Height
DUNCAN	1967	1.4 M			130 ft
		7.1 M			



Mica and Libby

Hydraulic Capacity	Dam Completed	Treaty Storage	Non-Treaty Storage	Installed Capacity	Height
MI			5.0 Maf	1740 MW	40
KC					
LIB			f	M	
KC					



Questions
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